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ABSTRACT

This study was an attempt to examine the relationship between readiness (as measured by the Metropolitan Readiness Test) and creativity (as measured by the Torrance Tests of Creative Thinking). The sample was 277 economically deprived kindergarten children in a city school system in the Southeastern United States. Scoring was carried out in terms of Guilford's divergent thinking factors of fluency, flexibility, originality and elaboration. The children's overall performance on the readiness tests was low compared with published norms. The profile of group averages, however, indicated the presence of some figural creativity skills that were not adversely affected by poverty conditions. Data analysis findings and derivative problems are discussed. Correlatical data suggests strongly the need to strengthen the training of this type of child in the general areas of art work, perceptual motor skills and elaborative responses if creativity development is to be enhanced. (TL)

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Figural Creativity and Convergent Thinking Among Culturally Deprived Kindergarten Children[1]

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Introduction

Investigations of the relationship between total IQ scores and creativity measures have reported relatively low but positive correlations. Getzels and Jackson (1962) found relatively low correlations (.11 to .52) between high creatives and low IQ students as well as among low creative and high IQ students. Torrance (1966, 1967) reported similar results (.10 to .29) in six out of eight studies. In 1967, Torrance described 29 studies in which the relationship between figural components of creativity and IQ ranged from .00 to .09. Holland (1961), Styles (1967) and Warren and Davis (1970) supported the hypothesis of low correlations between intelligence and creativity measures. Wallach and Kogan (1965), on the other hand, have insisted that creativity measures share common variance with measures of intelligence.

Measures of creative thinking ability and measures of school achievement based on standardized tests, teacher grades, and teacher estimates of creative potential were summarized by Torrance in 1967. The median of 65 coefficients of correlation between creativity measures and standardized measures of school achievement was .28. Bowers (1959) obtained coefficients of correlation ranging from .52 to .63 between creativity scores and measures of educational achievement in the intermediate grades; in high school Bowers (1966) found correlations between creativity and standardized achievement to range from .57 to .84.

Very little evidence is available about the general readiness ability of children preparing for first grade work. In preparing children for the curriculum demands in first grade performance emphasis upon the convergent processes of labeling, discrimination, and generalizations should be broadened to include the divergent processes in creativity. The present study was an attempt to examine the relationship between readiness (as measured by the Metropolitan Readiness Test) and creativity scores (as measured by Torrance's Tests of Creative Thinking).

Method

Subjects. The total sample in this study was 277 economically deprived kindergarten children in 15 classrooms. The kindergarten program was part of a Follow Through program in a city school system in the Southeastern United States. The number of children drawn from each classroom appears in Table 1. Within each classroom, homogeneity of creativity training was judged to be of no consequence so that the individual child is considered the sampling unit. This judgment is based on the fact that teaching in Follow Through programs is tightly controlled and monitored to assure that a "Sponsor's" instructional program is being implemented. In this program, the sponsor is Lassar Gotkin whose "Interdependent Learning Model" is a highly cognitive instructional process with a heavy emphasis on language development.

In May, the Metropolitan Readiness Test (MRT) (Hildreth, Griffiths, and McGauvran, 1965) and Torrance's (1966) Figural Tests of Creative Thinking were administered according to directions prescribed in the manuals.

Although two forms of the Torrance Tests are available, Form A was used here and consists of 3 non-verbal activities. Scoring is carried out in terms of Guilford's divergent thinking factors of fluency, flexibility, originality, and elaboration. Fluency is a measure of the number of ideas a subject can make to a task set or situation. Fluency is the ability to produce many appropriate concepts. Flexibility is a measure of the number of times a subject alters his view or approach to the situation. Scoring is the ability to produce diverse concepts in different classes or categories, shifting from one category to another. Originality is the ability to produce rare, unusual responses to specific situations. Elaboration (non-verbal) is the ability to add details to a particular stimulus. Figural components in the Torrance Tests are reported to have very little correlation with verbal components.

Results and Discussions

Table 2 presents summary statistics on all variables. Performance on the six MRT variables is low compared to MRT published norms. Overall performance is in the low

"C" range, thus the educational deprivation associated with economic deprivation is evident.

Performance on the four creativity indexes is mixed. According to Torrance (personal communication) Fluency, Flexibility, and Originality average performances are typical of children at this age level; however, Elaboration average performance is atypically low. This profile of group averages indicates the presence of some figural creativity skills in this group that have evidently not been adversely affected by poverty conditions. The low Elaboration average, on the other hand, is a point of concern since it is a task similar to some standard intelligence measures such as the Draw-a-Person type of scales. Moreover, it is likely related to more general weaknesses in the verbal domain such as limited vocabulary and limited verbal fluency. This surmise deserves specific investigation.

The intercorrelations of all variables appear in Table 3. The pattern of intercorrelations among TTCT variables is not greatly different from tables reported in the TTCT Manual. The high intercorrelations among the Torrance scales will be of concern to some investigators. In this regard it is important to note the difference in information gained by correlations and by means. The high correlations indicate redundancy in the sense that an individual's rank on one variable is predictable from his rank on another variable. Rank-order is quite different from level-of-performance The profile, previously discussed, indicates the value of the four variables separately scored. We were able to observe a weakness in one area--elaboration--in spite of high scale intercorrelations. Criticism of intercorrelated scales might often be tempered by considering cases like the one being presented.

The two sets of measures were analyzed by canonical analysis. Canonical correlations and associated tests appear in Table 4. Only one canonical appears to be of interest. The canonical variate weights appear in Table 5.

The creativity component appears to be dominated with Elaboration and Flexibility. Fluency appears to act as a suppressor variable. (This suppressor effect is discussed at length in later paragraphs.) Originality is minimally associated with

the first canonical.

The most important MPT variable related to the creativity component is Copying. Number and Word Meaning appear to have a major relationship to the creativity component also. Alphabet's weight is less important and the weights of Listening and Matching are trivial.

Interpretation of these weights is enhanced by searching the matrix of zero-order correlations (Table 3). All but one of the across-set correlations are signifi cant, but the largest values are found for Copying. In fact, the Copying-Elaboratior correlation is .55, not much less than the canonical correlation of .60. Copying also correlates substantially with the other creativity tests.

This finding of the importance of Copying can be interpretted substantively or methodologically. A substantive interpretation that is suggested is that figural creativity performance requires the same skills as Copying, namely, the ability to form mentally an image to be drawn (but which is provided for the subject in Copying) to reproduce this image pictorially, and to test the drawing against the mental image for accuracy.

The methodological interpretation is that the response made in Copying parallels that of the figural tests so that the motor-perceptual development of the child is being tested by both tests. The methodological concern is literally whether or not these children are mature enough to respond accurately to one or both tests. New data are being gathered using highly controlled test administration. This new data might allow us to discount methodology as a factor or might allow us to more firmly reject any substantive claims.

In either case, these correlational data do suggest strongly the need to strengthen the training of this type of child in the general areas of art work, motor-perceptual skills, and elaborative responses if we wish to enhance creativity development.

The remaining discussion deals with Fluency as a possible suppressor variable. Fluency appears to behave as a classical suppressor variable. It correlates positively with each readiness variable, it have a negative loading on the canonical variate,

and it correlates extremely highly with the other creativity measures (.93 with Flexibility, .89 with Originality, and .61 with Elaboration). The value of Fluency as a suppressor variable is low. The largest across-set zero-order correlation is .55 (Copying with Elaboration). Thus, the suppressor effect is only a very small contribution -- a part of the .05 increase obtained by canonical procedures.

The notion of a suppressor variable is usually associated with univariate multiple regression. The appearance of a possible suppressor in canonical analysis, however, can be explained along the same lines--Fluency correlates highly with non-ERT variance in the other creativity measures. It possibly acts to suppress this irrelevant variability, and thereby adds to the canonical correlation.

Warnings concerning this finding are the same as warnings in regard to the finding of suppressor variables in univariate problems. In the first place, suppressors are rare. In the second place, they usually disappear upon cross validation. This means that they are often sampling accidents. Thus, the canonical weights reported in this study require cross-validation prior to concluding that a true suppressor has been found in a multivariate problem. Unfortunately, gathering, scoring, and interpreting creativity measures is expensive. Perhaps students of creativity have similar data that can be reanalyzed by canonical analysis as a check on these findings. These writers are obtaining new data this year on a new sample from this same population.

One other highly important problem is related to that of the disappearance of suppressor effects upon cross validation. In unpublished work by Harry E. Anderson, Jr., and W. L. Bashaw, apparent suppressor effects were seen to be highly affected by trivial differences in computational accuracy. That is, minor changes in any of the intercorrelations could result in drastic changes in a multiple correlation and regression weights, if suppressor variables are involved.

Moreover, one might consider other linear functions of the creativity measures. A simple summation of the scores would be justified on the basis of the high intercorrelations among the four creativity tests (although other considerations might

not justify this addition). Such a simple composite will probably also correlate with total MRT scores in the neighborhood of .5 to .6. That is to say, the canonical weights might provide the highest relationship, but radically different weighting schemes that are also justifiable rationally might also provide relationship measures that are not significantly lower than the canonical correlation.

Table 1

Sample Sizes for Each Classroom Unit

Class Code	Frequency
1	21
2	23
3	19
4	17
5	13
6	19
7	13
8	16
9	22
10	17
11	22
12	21
13	17
14	21
15	16
Total	277

Table 2

Means and Standard Deviations of All Variables

Variable	Mean	Standard Deviation
1. WM	6.8	2.5
2. LIS	9.4	2.5
3. MAT	6.4	3.0
4. ALP	7.6	4.4
5. NUM	8.6	4.1
6. COP	5.0	4.0
7. FLU	13.9	6.9
8. FLEX	11.0	5.6
9. ORIG	22.9	12.6
10. ELAB	21.5	14.5

Table 3

Intercorrelations Matrix for Metropolitan Reading Readiness and Figural Creativity*

Variables	1	2	3	4	5	6	7	8	9
1. WM									
2. LIS	.34								
3. MAT	.38	.31							
4. ALP	.28	.32	.42						
5. NUM	.35	.37	.43	.60					
6. COP	.34	.26	.36	.46	.47				
7. FLU	.18	.14	.20	.31	.33	.35			
8. FLEX	.22	.17	.23	.34	.37	.38	.93		
9. ORIG	.19	.11	.15	.23	.30	.33	.89	.86	
10. ELAB	.32	.25	.29	.36	.40	.55	.61	.60	.50

* A correlation of .12 is significant with N=277.

Table 4

Canonical Correlation Tests for All Roots

Latent Root	Canonical Correlation	Wilks Lambda	Chi Square	Degrees of Freedom	P Less Than
1	.60	.597	139.97	24	.0001
2	.21	.938	17.29	15	.3016
3	.11	.980	5.38	8	.7160
4	.09	.991	2.37	3	.4992

Table 5

Standardized Canonical Variate Weights for the First Latent Root

Readiness		Creativity	
Variable	Weight	Variable	Weight
WM	0.179	FLU	-0.611
LIS	0.072	FLEX	0.615
MAT	0.033	ORIG	0.170
ALP	0.100	ELAB	0.885
NUM	0.249		
COP	0.663		

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